



PIER Energy-Related Environmental Research

Environmental Impacts of Energy Generation, Distribution and Use

Corridor Effects on the Endangered Plant Kern Mallow and Its Habitat

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Contractor: California State University, Stanislaus, Endangered Species Recovery Program

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The Issue

California has about 40,000 miles of high-voltage electricity transmission lines crisscrossing its varied landscapes.¹ These lines connect electricity-generating plants to substations, which lower the voltage and allow power to be delivered to our doorsteps. California also has the most extensive and diverse population of native animals and plants of any state in the country, composed of almost 1,000 native vertebrate species and 5,057 native plant species.²



Kern mallow (*Eremalche kernensis*)

The health of each of these two valuable resources—California's electricity transmission infrastructure and its wealth of plant and animal species—is essential for maintaining the quality of life in the state.

When new or increased electricity demand requires transmission lines to cross sensitive habitat, those responsible for siting the transmission lines need information on the potential impacts of those lines and their related access roads on threatened or endangered species. Roads alter the physical and chemical conditions of the habitat, potentially making it unsuitable for native species while creating conditions favorable for nonnative plants. Nonnative plants compete with native plants for water and nutrients and change the structure of the habitat, impeding movements of small animals such as lizards and kangaroo rats. Endangered plants and animals may experience gradual declines and eventually die out after their habitats are altered by road construction or invaded by nonnative plants. Design modifications during transmission line construction and protective intervention in existing transmission corridors can ensure the continued survival of these species.

Hundreds of animal and plant species in California are listed as threatened and/or endangered;³ therefore, it is crucial that planners and decision makers receive sound scientific information regarding the potential impacts of new line construction on these species.

¹ California Energy Commission. April 2004. *A Roadmap for PIER Research on Biological Issues of Siting and Managing Transmission Line Rights-of-Way*. PIER Environmental Area. 500-04-031.

² Schoenherr, A. A. 1992. *A Natural History of California*. University of California Press, Berkeley, California.

³ California Department of Fish and Game. www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml.

The need for scientific information is especially urgent now, because the state needs to expand its transmission lines. A recent study of transmission research and development in California concluded that “expansion of the California transmission system has not kept pace with demand over the last 20 years...[resulting in] congestion, reliability problems, and higher costs.”⁴ Moreover, the new renewable energy units that will be brought online in response to the state’s Renewable Portfolio Standard (RPS) will need new transmission lines to tie them to the electricity grid.

One area of concern is the Lokern area in Kern County, California, which has been designated a “core area” for recovery of a number of state and/or federally listed species, including the San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat. The area also contains virtually all populations of a federally listed endangered plant—the Kern mallow (*Eremalche kernensis*).⁵ Therefore, it is critical to find ways to protect these endemic Kern mallow populations. A better understanding of how transmission line corridor activities affect the survivorship of Kern mallow may also be applied to other, similar species.

Project Description

PIER-EA funded work by the California State University, Stanislaus, Endangered Species Recovery Program (ESRP) to help ensure that current and future transmission lines in the Lokern area do not contribute to the decline of the endangered plant Kern mallow or to the degradation of habitat for rare and endangered animals.

The project objectives were to (1) determine whether Kern mallow plants in transmission line corridors have the same survival and reproductive rates as those outside of the corridors, (2) determine whether transmission line corridors are contributing to the dominance of nonnative plants in the Lokern area, (3) determine whether the Kern mallow population is stable or declining overall, and (4) provide preliminary recommendations for the management of transmission line corridors in the Lokern area.

Biologists from ESRP studied Kern mallow plants throughout their life cycles, beginning when the seeds sprouted in late winter of 2004 and continuing until the plants matured and produced seeds in late spring of that year. They recorded survival to the flowering stage and the number of flowers and seeds produced per plant. The biologists also collected data on the relative abundance of nonnative and native plants in belts extending from the edge of roads to the middle of the undisturbed habitat.

PIER Program Objectives and Anticipated Benefits for California

This project offers numerous benefits and meets the following PIER program objective:

- **Providing environmentally sound electricity.** By identifying the environmental and habitat impacts of transmission line corridors, this work will help protect rare and endangered species in the Lokern area. Planners and decision makers will be able to use the results of this study to minimize the environmental impacts of current transmission lines and any future expansions. The methodology and the recommendations may also be useful in other parts of California where transmission lines and roads may conflict with endangered species.

⁴ California Energy Commission. November 2003. *Five-Year Transmission Research and Development Plan*. 500-03-104F. p. 4.

⁵ U.S. Fish and Wildlife Service. 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Region 1, Portland, Oregon.

Results

Kern mallow had lower survival rates in corridors than outside of corridors (Figure 1), as verified by statistical tests. Survival rates were reduced even in corridors where the roads were rarely used. However, the number of flowers per plant did not differ in and out of corridors (Figure 2), nor did seed production. Kern mallow was more sensitive to disturbance from corridors and livestock grazing in areas that had burned in a 1997 wildfire.

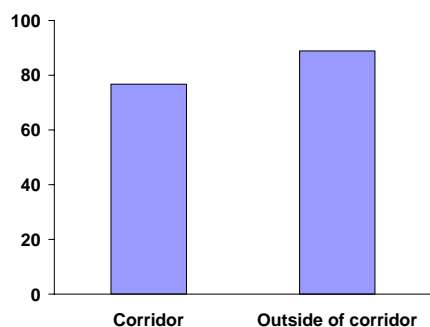


Figure 1. Percent survival of Kern mallow

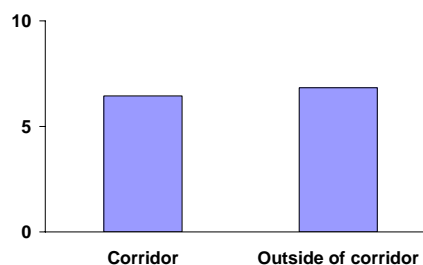


Figure 2. Number of flowers per Kern mallow plant

Nonnative plants were no more abundant in corridors than outside of corridors, nor did their abundance change predictably with distance from road edges. It is too early to predict the population trends of Kern mallow, but the study will continue in 2005 with funding from the U.S. Bureau of Reclamation to address that objective.

ESRP researchers reached the preliminary conclusions—based on a small number of study plots and one growing season with below-average rainfall—that (1) Kern mallow survival was reduced on all road corridors (with or without transmission lines) regardless of how heavily the roads were used, and (2) nonnative plants were equally spread throughout the Lokern area and were not more abundant on roads. The researchers recommended installing any new transmission lines in the Lokern area along existing roads rather than creating new corridors, to avoid further reducing Kern mallow survival. Restoration of the burned areas and better livestock management in corridors were also recommended.

Final Report

The final report for this project will be available in May 2005 and will be posted at http://www.energy.ca.gov/pier/final_project_reports/CEC-500-2005-063.html.

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